#751

VOYAGER 1 AND 2

24-HR LECP COSMIC RAY CRUISE DATA

77-084A-07H/77-076A-07J

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THIS DATA SET CONSISTS OF ONE MAGNETIC TAPE. THE TAPE IS 9-TRACK, 6250, WRITTEN IN ASCII, WITH A STANDARD LABEL NAME OF "LECP1" THE README.DOC FILE WAS RENAMED TO READ "VY1.README.DOC AND VY2.README.DOC. THE DATA SET DOCUMENTATION IS CONTAINED IN THE FILE WITH THE DAILY AVERAGE COUNT RATE DATA. THE D AND C NUMBER ALONG WITH THE TIMESPAN IS LISTED BELOW.

DD#	DC#	FILES	TIMESPAN
D-107797	C-031603	4	09/07/77-12/30/93

Voyager 1 LECP data: 1 day averages

Voyager 1:

launch date:	1977, day 248 (Sep. 5)
closest approach to Jupiter:	1979, day 65 (Mar. 5)
closest approach to Saturn:	1980, day 316 (Nov. 12)

1. INSTRUMENTAL BACKGROUND:

This data file contains 1 day averages of count rates for 11 energetic ion channels from the Low Energy Charged Particle (LECP) instrument on Voyager 1. Details of the instrument and responses of the channels of interest can be found in the references

I. Krimigis, S. M., T. P. Armstrong, W. I. Axford, C. O. Bostrom, C. Y. Fan, G. Gloeckler, and L. J. Lanzerotti, The low energy charged particle (LECP) experiment on the Voyager spacecraft, Space Sci. Rev., vol. 21, p. 329, 1977.

II. Krimigis, S.M., J. F. Carbary, E. P. Keath, C. O. Bostrom, W. I. Axford, G. Gloeckler, L. J. Lanzerotti, and T. P. Armstrong, Characteristics of hot plasma in the Jovian magnetosphere: results from the Voyager spacecraft, J. Geophys. Res., vol. 86, pp. 8227-8257, 1981.

The LECP instrument consists of the two subsystems called the Low Energy Magnetospheric Particle Analyzer (LEMPA) and the Low Energy Particle Telescope (LEPT).

The primary ion detector on the LEMPA is a surface barrier detector with its aluminum contact surface facing the direction of incident particles, so as to avoid radiation damage of the surface barrier. This detector measures the total energy of incident ions, but can not identify the ion species. The eight ion channels designated below as PL01-PL08 are differential in energy channels with different energy passbands and efficiencies for various ion species. We list only energy passbands and flux conversion factors for protons. A table listing passbands and efficiencies for He, O, and S nuclei is given in the above reference II.

The cosmic ray channel designated below as EB05 corresponds to measurements by a heavily-shielded surface barrier detector, also on the LEMPA subsystem. This channel measures cosmic ray protons with energies above 70 MeV.

The LEPT employs a set of solid state detectors ranging in thickness from 2 to ~2500 microns, and an arrangement of eight rectangular solid state detectors in an anticoincidence cup. The two differential in energy proton channels designated below as Ch1 and Ch16 correspond to measurments from the LEPT subsystem.

The LECP steps through eight 45 degree sectors, with the stepping rate depending upon the spacecraft mode. Generally, in the interplanetary medium, each sector is sampled for 192 sec or 6 min. Thus, the 24 hour averages sum over many 360 degree scans and correspond to measurements of the omnidirectional fluxes of the energetic ions.

2. PASSBANDS AND FLUX CONVERSION FACTOR

The data listed are averaged over 24 hours, with the start time of the averging interval begining at the start of the day listed. For example, 77/300 is an average over hours 0-23 on day 300 of 1977. Times are given in SCET-UT.

The count rates R are in counts per second. The statistical uncertainty for each channel is the inverse square root of the total number of counts during each 24 hour period times the average count rate R.

Included in the table below are the passbands in KeV for protons, the logarithmic mean energy Em for the differential energy channels, the geometric factor "g" (cm**2-steradian), and the flux conversion factor "f". To get from count rate R to differential in energy flux "dj(E)/dE", multiply R by f, i.e.,

dj(E)/dE=f*R.

Note that f is simply the inverse of the energy passband multiplied by the geometric factor. Generally one uses a more elaborate algorithm to calculate fluxes by determining the local slope of the energy spectrum within each energy passband, usually by an iterative algorithm, and then evaluating the flux corresponding to each channel using this slope. However, if the slope of the energy spectrum is not to steep, the approximation dj(E)/dE=f*R is very good if the flux is evaluated at the mean energy Em=Sqrt(EL*EH), where EL and EH are the low and high energy ends of the passband. Since the slopes of low energy ion spectra in the interplanetary medium are in the range of -1 to -3, the approximation is very good.

chan.	passband(keV) (protons)	Em(KeV)	g(cm**2-sr)	f[1/(cm**2 sec sr keV)]
PL01	30-53*	40	0.040	1.09
	40-53#	46	0.016	4.81
PL02	53-85	67	0.04	0.781
PL03	85-139	109	0.04	0.463
PL04	139-220	175	0.04	0.309
PL05	220-550	348	0.04	0.0758
PL06	550-1050	760	0.04	0.0500
PL07	1050-2000	1449	0.04	0.0263
PL08	2000-4000	2828	0.04	0.0125
Ch1	570-1780	1007	0.44	1.88e-03
Ch16	3400-17600	7736	1.5	4.70e-05
EB05	>70 MeV		~0.3	

* PL01 passband from launch to 1979, day 67, 0530 UT.
\# PL01 passband from 1979, day 67, 0530 UT, to the present.

3. DATA FILE FORMAT

The contents of each 1-day averaged record are as follows:

```
yr/day  PL01 rate(rate unc.)  PL02 rate(rate unc.)  PL03 rate(rate unc.)
        PL04 rate(rate unc.)  PL05 rate(rate unc.)  PL06 rate(rate unc.)
        PL07 rate(rate unc.)  PL08 rate(rate unc.)   Ch1 rate(rate unc.)
        Ch16 rate(rate unc.)  EB05 rate(rate unc.)
```

Each record is ASCII written with the FORTRAN format statement:

```
      format(' ', i2, '/', i3, 3(1pe11.3, '(', 1pe9.2, ')')/
     *                   ' ', 6x, 3(1pe11.3, '(', 1pe9.2, ')')/
     *                   ' ', 6x, 3(1pe11.3, '(', 1pe9.2, ')')/
     *                   ' ', 6x, 2(1pe11.3, '(', 1pe9.2, ')'))
```

Missing data due to tracking gaps and bad data that has been deleted has been given the value -99.0.

Questions regarding this data file can be addressed to:

Rob Decker
The Johns Hopkins Univ. Applied Physics Lab.
Johns Hopkins Rd.
Laurel, MD 20707-6099
phone: (301) 953-5000 ext. 8696
electronic mail:
SPAN: APLSP::DECKER
Internet: Robert_Decker@jhuapl.edu

4. DATA FILE

```
--------------------------------------------------------------------
YR/DOY  PL01 rate(rate unc.)  PL02 rate(rate unc.)  PL03 rate(rate unc.)
        PL04 rate(rate unc.)  PL05 rate(rate unc.)  PL06 rate(rate unc.
        PL07 rate(rate unc.)  PL08 rate(rate unc.)   Ch1 rate(rate unc.)
        Ch16 rate(rate unc.)  EB05 rate(rate unc.)
--------------------------------------------------------------------

77/250  1.151E+00( 6.22E-03)  4.314E-01( 2.87E-03)  2.997E-01( 2.39E-03)
        1.962E-01( 1.97E-03)  3.023E-01( 2.54E-03)  1.274E-01( 1.65E-03)
        7.757E-02( 1.29E-03)  3.234E-02( 8.01E-04)  5.057E-01( 3.16E-03)
```

Voyager 2 LECP data: 1 day averages

Voyager 2:

launch date:	1977, day 232 (Aug. 20)
closest approach to Jupiter:	1979, day 190 (Jul. 9)
closest approach to Saturn:	1981, day 316 (Aug. 25)
closest approach to Uranus:	1986, day 24 (Jan. 24)
closest approach to Neptune:	1989, day 316 (Aug. 25)

1. INSTRUMENTAL BACKGROUND:

This data file contains 1 day averages of count rates for 11 energetic ion channels from the Low Energy Charged Particle (LECP) instrument on Voyager 2. Details of the instrument and responses of the channels of interest can be found in the references

I. Krimigis, S. M., T. P. Armstrong, W. I. Axford, C. O. Bostrom, C. Y. Fan, G. Gloeckler, and L. J. Lanzerotti, The low energy charged particle (LECP) experiment on the Voyager spacecraft, Space Sci. Rev., vol. 21, p. 329, 1977.

II. Krimigis, S.M., J. F. Carbary, E. P. Keath, C. O. Bostrom, W. I. Axford, G. Gloeckler, L. J. Lanzerotti, and T. P. Armstrong, Characteristics of hot plasma in the Jovian magnetosphere: results from the Voyager spacecraft, J. Geophys. Res., vol. 86, pp. 8227-8257, 1981.

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2. PASSBANDS AND FLUX CONVERSION FACTORS

The data listed are averaged over 24 hours, with the start time of the averging interval begining at the start of the day listed. For example, 77/300 is an average over hours 0-23 on day 300 of 1977.

The count rates R are in counts per second. The statistical uncertainty for each channel is the inverse square root of the total number of counts during each 24 hour period times the average count rate R.

Included in the table below are the passbands in KeV for protons, the logarithmic mean energy Em for the differential energy channels, the geometric factor "g" (cm**2-steradian), and the flux conversion factor "f". To get from count rate R to differential in energy flux "dj(E)/dE", multiply R by f, i.e.,

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Note that f is simply the inverse of the energy passband multiplied by the geometric factor. Generally one uses a more elaborate algorithm to calculate fluxes by determining the local slope of the energy spectrum within each energy passband, usually by an iterative algorithm, and then evaluating the flux corresponding to each channel using this slope. However, if the slope of the energy spectrum is not to steep, the approximation dj(E)/dE=f*R is very good if the flux is evaluated at the mean energy Em=Sqrt(EL*EH), where EL and EH are the low and high energy ends of the passband. Since the slopes of low energy ion spectra in the interplanetary medium are in the range of -1 to -3, the approximation is very good.

chan.	passband(keV) (protons)	Em(KeV)	g(cm**2-sr)	f[1/(cm**2 sec sr keV)]
PL01	28-43	35	0.113	0.59
PL02	43-80	59	0.113	0.239
PL03	80-137	105	0.113	0.155
PL04	137-215	172	0.113	0.114
PL05	215-540	341	0.113	0.0272
PL06	540-990	731	0.113	0.0197
PL07	990-2140	1456	0.113	7.70e-03
PL08	2140-3500	2737	0.113	6.51e-03
Ch1	520-1450	868	0.44	2.44e-03
Ch16	3040-17300	7252	1.5	4.68e-05
EB05	>70 MeV		~0.3	

3. DATA FILE FORMAT

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```

```
     *                 ' ', 6x, 2(1pe11.3, '(', 1pe9.2, ')'))
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SPAN: APLSP::DECKER
Internet: Robert_Decker@jhuapl.edu

4. DATA FILE

```
---------------------------------------------------------------------------
YR/DOY  PL01 rate(rate unc.)  PL02 rate(rate unc.)  PL03 rate(rate unc.)
        PL04 rate(rate unc.)  PL05 rate(rate unc.)  PL06 rate(rate unc.)
        PL07 rate(rate unc.)  PL08 rate(rate unc.)   Ch1 rate(rate unc.)
        Ch16 rate(rate unc.)  EB05 rate(rate unc.)
---------------------------------------------------------------------------

 77/250  2.485E+00( 1.11E-02)  2.135E+00( 1.03E-02)  1.371E+00( 8.27E-03)
         9.460E-01( 6.85E-03)  1.353E+00( 8.19E-03)  4.261E-01( 4.60E-03)
         2.545E-01( 3.55E-03)  6.562E-02( 1.80E-03)  1.466E+00( 8.56E-03)
```

FATAR

TAPE SUMMARY FOR TAPE VOLUME -KM2019- AT DENSITY 6250 BPI

9/27/94

PHYS FILE	DATASET NAME (LAST 17 CHARS)	FILE SERIAL	FIL# VOL#	CRDATE	EXPDATE	REC-FM	LRECL BLKSZ	CREATING JOB&STEP	SEC	BLOCKS READ	BYTES READ	PERM TEMP	---BLOCKSIZES---- MIN	AVG	MAX	EST. FEET
1	ZMVMDSCN.R0002804									5	400	0 0	80	80	80	0
2	ZMVMDSCN.R0002804									1	32K	0 0	32000	32000	32000	0
3	ZMVMDSCN.R0002804									4	320	0 0	80	80	80	0
4	ZMVMDSCN.R0002804									4	320	0 0	80	80	80	0
5	ZMVMDSCN.R0002804									53	1696K	0 0	32000	32000	32000	24
6	ZMVMDSCN.R0002804									4	320	0 0	80	80	80	0
7	ZMVMDSCN.R0002804									4	320	0 0	80	80	80	0
8	ZMVMDSCN.R0002804									1	32K	0 0	32000	32000	32000	0
9	ZMVMDSCN.R0002804									4	320	0 0	80	80	80	0
10	ZMVMDSCN.R0002804									4	320	0 0	80	80	80	0
11	ZMVMDSCN.R0002804									53	1696K	0 0	32000	32000	32000	24
12	ZMVMDSCN.R0002804									4	320	0 0	80	80	80	0
13	ZMVMDSCN.R0002804									0	0	0 0	0	0	0	0

HIGHEST EXPIRATION ====> ________ TOTALS ====> 141 3459K 0 48